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Absorption features in the spectra of x-ray bursting neutron stars

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Abstract

The photospheric absorption lines in the XMM-Newton spectra of the X-ray bursting neutron star EXO0748-676 were found by Cottam et al. (2002)1 and identified as the n = 2-3 transitions in hydrogen and helium like ions of iron, gravitationally redshifted with z = 0.35. We check these conclusions using model atmosphere calculations. The extended set of the NLTE model atmospheres with effective temperature from 1 to 20 MK and various iron abundance, from solar up to practically pure iron atmospheres was calculated. Results of these computations were checked by LTE calculations for investigations of Compton scattering and chemical compositions influence. Results are in the good qualitative agreement. Main our conclusion is the following. The n = 2 - 3 lines of FeXXV are very weak and can not be observed, even if the atmosphere has 99 % of iron. But the lines of previous state of ionization, lithium like iron, Fe XXIV, are more intensive, but they correspond to gravitational redshift z = 0.24. Iron XXIV lines are more prominent in comparison to iron XXV lines in this energy band for all effective temperatures. It is necessary to remark that the equivalent widths of iron XXIV also too weak in comparison to the observed absorption features.

Keywords

EXO 0748-676, Line formation, Line identification, Neutron stars, Scattering, X-rays star